

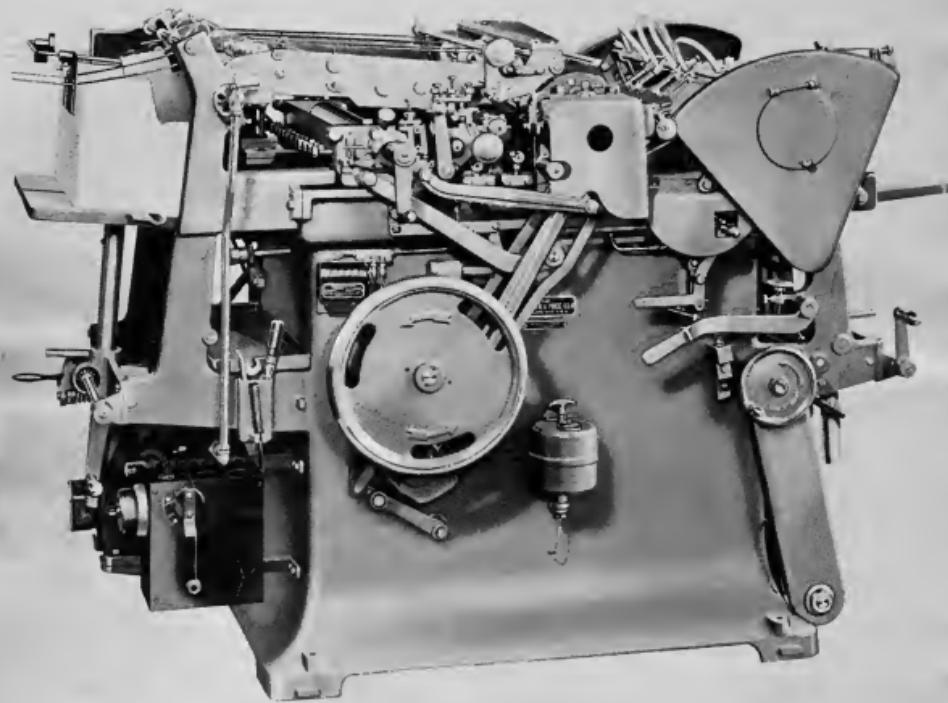
# INSTRUCTIONS

for operating  
The Chandler & Price  
**CYLINDER  
PRESS**





**INSTRUCTIONS FOR OPERATING  
THE  
CHANDLER & PRICE  
No. 2 CYLINDER PRESS**



# FOREWORD

The Chandler & Price Company has prepared this book as a guide to efficient operation of the Chandler & Price No. 2 Cylinder Press. As always, our goal is to assist owners and operators of Chandler & Price equipment in the constant search for methods of increasing quality work and volume of profits.

When outlined procedure is followed, you can confidently expect top performance from the C & P No. 2 Cylinder Press. If, however, any set of unusual circumstances should arise to present new operating problems, we will be glad to work with you to solve them.

*The Chandler & Price Company*

CLEVELAND, OHIO

# EQUIPMENT

Standard equipment consists of 3 h.p. motor and electrical equipment (motor of unusual specifications at additional cost); V-belts and belt guard; one set of non-meltable composition rollers; one set of roller stocks; two steel chases; one built-in gas heater; one impression counter; one roller stand . . . Electric heater can be supplied as special equipment . . . Slur eliminator; set of wrenches; form roller setting gauge.

# SPECIFICATIONS

Inside chase measurements — Regular . . . . .	12½" x 17 <sup>7</sup> / <sub>16</sub> "
Skeleton . . . . .	12¾" x 17 <sup>11</sup> / <sub>16</sub> "
Largest sheet . . . . .	12¼" x 18½"
Smallest sheet . . . . .	3¼" x 5½"
Stock capacity of feeder . . . . .	18"
Stock capacity of delivery . . . . .	18"
Speed range (impressions per hour) . . . . .	Up to 4800
Diameter (1) large form roller . . . . .	3⅛"
Diameter (1) small form roller . . . . .	2"
Diameter (2) distributor rollers . . . . .	1¾"
Diameter (1) fountain ductor roller . . . . .	1¾"
Diameter (1) rider . . . . .	1"
Diameter (2) vibrators . . . . .	2"
Diameter (1) vibrator . . . . .	1 <sup>15</sup> / <sub>16</sub> "
Diameter (1) fountain roller . . . . .	2 <sup>1</sup> / <sub>4</sub> "
Overall width . . . . .	.37"
Overall length . . . . .	5' 10"
Overall height . . . . .	4' 6"
Will pass through opening (with fountain lever removed) . . . . .	36"
Motor horsepower . . . . .	3
Weight (net) . . . . .	2324 lbs.
Weight (crated for shipment) . . . . .	2642 lbs.

# INSTALLATION OF PRESS

**UNPACKING** — The Chandler & Price Cylinder Press comes to you completely set up ready to run. After being carefully unpacked and cleaned of dirt and grease, the press is ready to be set in position.

**CARE AND OILING** — After setting up the press, it should be thoroughly oiled. Always oil before starting every morning and noon. The variable speed pulley is oiled at oil cup "M", Fig. 334 (page 7). The No. 2 Cylinder Press has centralized lubricating system, Fig. 333 (page 5) and the one shot container should be filled with No. 20 SAE oil at "A". However, there are a few places that must be oiled by hand. The pump should be oiled with No. 50 SAE oil through door "B", Fig. 334 (page 7). Oil in the bed track should always be kept sufficiently high to cover the tracks so that the bed rollers can pick up the oil. All moving parts and bearings should be oiled and greased frequently and thoroughly.

**STARTING PRESS** — The final press

test at the factory is made with the cylinder adjusted to run a medium weight  $8\frac{1}{2}'' \times 11''$  sheet of paper. Use this size sheet to start the press upon its arrival before putting in a form or inking up. This will facilitate becoming acquainted with the different movements of the press before making any adjustments.

The starting lever 66, Fig. 333 (page 5), should be resting on the spring in the lug on the side of the press. Start the motor by turning on electric switch and move control handle which will be mounted on control bracket, Fig. 333 (page 5). This puts in motion the air pump and the rear delivery tapes. Make sure that the roller carriage is in running position and locked securely by handle No. 50, Fig. 337 (page 13), and that the delivery carriage No. 1057, Fig. 337 (page 13), is in delivering position.

Start press slowly by pulling up starting lever No. 66, Fig. 333 (page 5), and hold lever up, allowing press to run for a few minutes. Stop press with bed toward delivery end when working on forms.

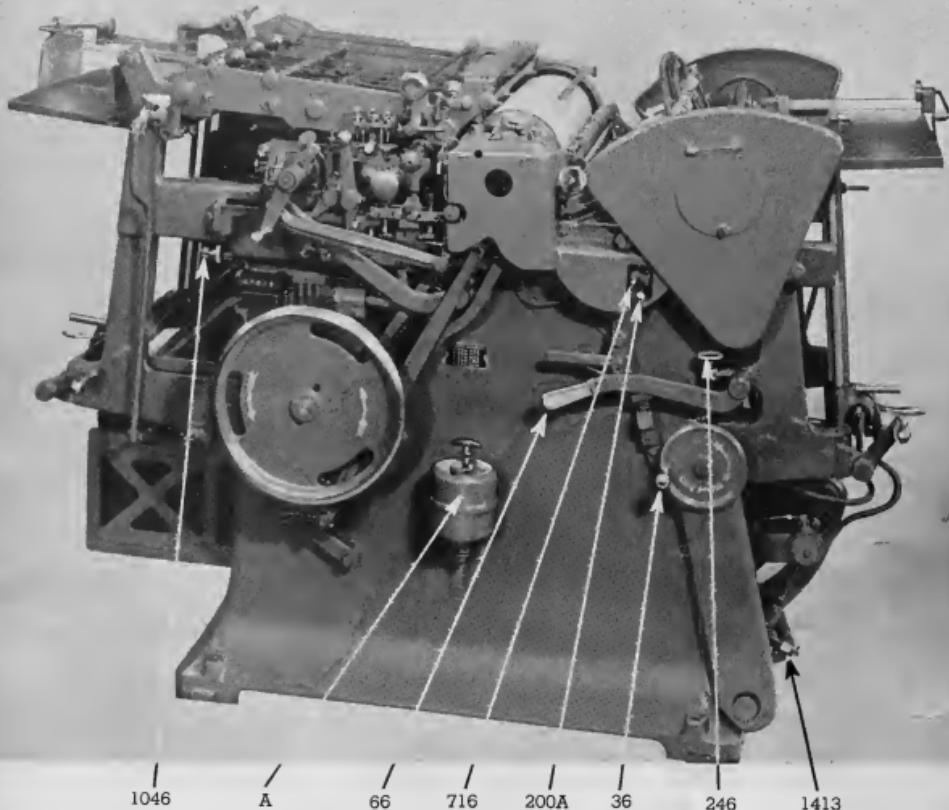
## OPERATION

### SEQUENCE OF OPERATION FOR C & P NO. 2 CYLINDER PRESS—

1. Packing cylinder.
2. Setting grippers.
3. Inking up of press.
4. Setting and adjusting rollers.
5. Locking form on bed.
6. Set feed pile guides and adjust air blast.
7. Pull sheet for position. Set side and drop guides and then pull make-ready sheet.  
Setting of fountain.
8. Setting feeder and registering of sheets.
9. Setting delivery.

10. If close register, run 10 sheets through twice; if the register is O.K. run 100 sheets to be used for fall-ins to check register every so often throughout the run. This point cannot be stressed too strongly as it will more than pay for the time spent in knowing your register is correct throughout a long run.

**PACKING CYLINDER** — For final testing at the factory, the cylinder was properly packed and this packing remains on the press when shipped. Examination will indicate the correct amount of packing and also how packing is placed and held on the cylinder.



**FIGURE 333—Operator's Side of Press**

1046—Contact Adjusting Nut  
**A**—One Shot Oil Supply Tank and Plunger  
66—Starting Lever  
716—Handle for Pulling Single Impression

200A—Emergency Throwoff Handle  
36—Hand Wheel Changing Bed Stroke for Different Size Sheets  
246—Screw for Adjusting Speed of Press  
1413—Bed Adjusting Lock Pin

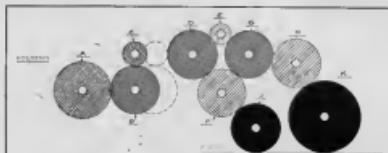
In order to be sure that you have the correct packing, when this packing is taken off, staple sheets together and save for future reference.

To replace packing, first set press to longest possible stroke by pulling out pin No. 1413, Fig. 333 (page 5), and then turning handwheel No. 36, Fig. 333 (page 5), in the direction the arrow points. Run bed out to delivery end. Place make-ready table over the roller carriage. The two metal feet with the holes, attached to the table, are placed over the heads of the cap screws on the ink fountain. Open the tympan bale No. 276, Fig. 336 (page 11), by inserting pin wrench in the hole of the bale shaft and tapping the wrench smartly with the hand. Pull out the tympan sheets from under the bale and back up the press, pushing in cam No. 200D, Fig. 336 (page 11), and holding until the gripper roller rests on the highest point, thereby holding grippers open. Release the tympan clamp by backing off screw No. 1209, Fig. 335 (page 9), and remove packing.

**AMOUNT OF PACKING**—The printing surface of the cylinder should be covered with five sheets of treated tympan paper .005" thick, size 18" x 12 $\frac{5}{8}$ ", long enough to fold  $\frac{3}{4}$ " under the tympan clamp bar but not long enough to reach under the bale clamp. This is your permanent packing. Then place five sheets of S & S C 50 lb. book, size 18" x 15 $\frac{3}{8}$ ", with two draw sheets of treated tympan paper the same size as the S & S C book.

After clamping the new packing at the gripper end, turn the press in the opposite direction, insert the tympan sheets under the bale and run your thumb along the sharp edge of the cylinder, making a right angle bend in the sheets. Then while holding very tightly, clamp by a quick downward push on both thumb plates of the bale bar.

**SETTING GRIPPERS**—When setting grippers, always place a piece of 6-ply cardboard between the gripper stop lug, No. 275, Fig. 335 (page 9). Loosen all the grippers on the gripper bar with the gripper wrench. Then



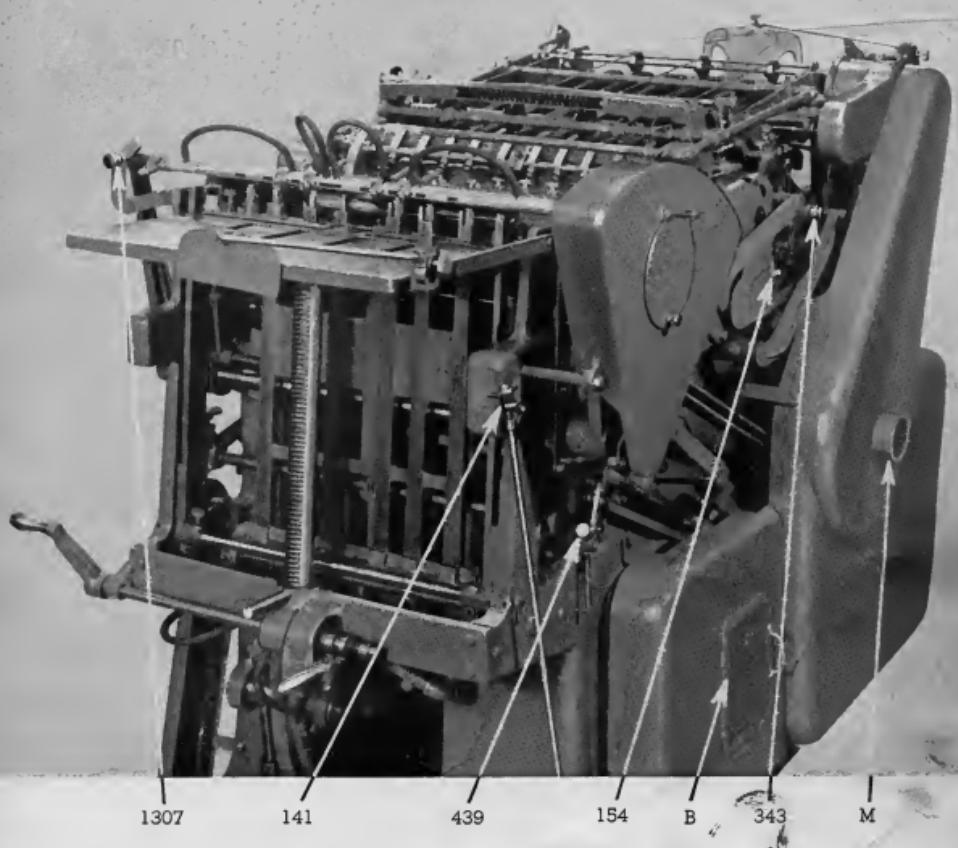
hold the gripper marked No. 1, Fig. 335 (page 9), tightly on the cylinder and tap lightly with the wrench. Then tighten the setscrew. This is done to each gripper in the order marked in the illustration. CAUTION—Be sure all gripper setscrews are tight, as a loose gripper can cause much damage.

**INKING UP OF PRESS**—Place form rollers, distributors and vibrator in place according to the diagram of inking mechanism shown above. Place ink in the fountain, set ductor trip in notch nearest cylinder. Then turn fountain crank until ductor roller is covered with ink. Replace trip in automatic fountain trip position.

**SETTING ROLLERS**—Lift the roller on one side and slide the roller gauge under. Replace roller in socket, loosen the nut at the split end of block and then adjust sockets up or down until roller gauge shows a mark the width of one pica. Do this in three different positions on each roller. If out of round, it may be necessary to set roller lower so as to show  $\frac{1}{4}$ " mark on the roller gauge. Each form roller should be checked on both sides of the bed. Loosen the second nut on the roller block and wash ink off the form roller. Then move roller and socket assembly so the contact from the steel vibrator is the same width as the form roller is on roller gauge, namely one pica. The roller blocks are off center and by reversing same can give greater adjustment for oversize or undersize rollers.

In setting the distributor rollers, screw adjustment down to where top bearing just touches the roller bearing, then give it an extra quarter turn.

In setting the ductor rollers, lock roller



**FIGURE 334—Feeder End of Press**

1307 — Feeding Cam Lever  
141 — Lever for Controlling Air Blast  
439 — Thumbscrew for Adjusting  
Height of Stock  
154 — Cam Lever for Changing Side  
Guide

B — Door for Oiling Pump  
343 — Eccentric Stud for Adjusting  
Pressure Between Steel Ductor  
Roller and Distributor Roller  
M — Cup for Oiling Variable Speed  
Pulley

carriage with bed of press toward delivery end. Steel ductor roller should be parallel with distributor roller. If not, it may be adjusted by roller clamp bracket No. 54, Fig. 337 (page 13), until such is the case. Adjust pressure between steel ductor distributor roller by turning eccentric stud No. 343, Fig. 334 (page 7). Run the bed to the feeder end of the press and put automatic trip in manual notch with ductor roller against fountain roller. Set fountain to the ductor roller evenly and with a light pressure.

**LOCKING FORM ON PRESS**—Turn the press over until the type bed is at the delivery end. Lift the delivery and roller carriages and unlock the chase with pin wrench. Remove

chase and clean bed. Form should be locked so that the center of the sheet would be approximately in the center of the chase between the bearers and toward the side marked "Top" so that the top inside edge of the chase may be considered the form's dead line with the gripper margin of the sheet extending approximately  $\frac{3}{16}$ " beyond. A gripper dead line is marked on the bed of the press to assist in the correct position of the chase.

Place the chase on the bed with the top at the dead line and place furniture at the back and front. Unlock quoins in form and plane down form. Take spring out of chase and tighten the lugs against the furniture and tighten with the pin wrench. Then relock quoins.

## FEEDING AND PRINTING PAPER

### SETTING FEED PILE GUIDES—

To position side stock bars, center-crease sheet to be printed. Place the sheet on stock elevator table so that the crease is approximately  $\frac{1}{4}$ " to right or left of the center line on the table top. This permits the side register to move the sheet to the center to conform with the central setting of form in the chase. Move the side stock bars in to the sheet and the table is ready for loading.

**PAPER SEPARATION**—The feeder separation wires No. 447, Fig. 336 (page 11), should be bent slightly over the corners of the pile so that the suckers will have to pull the sheets past the wires. Wires must be set sufficiently above the top of the stock pile to permit airing and fluffing. The air blast is controlled by turning lever No. 141, Fig. 334 (page 7), at the right-hand side of the feed table.

### LOADING AND ADJUSTING ELEVATOR—

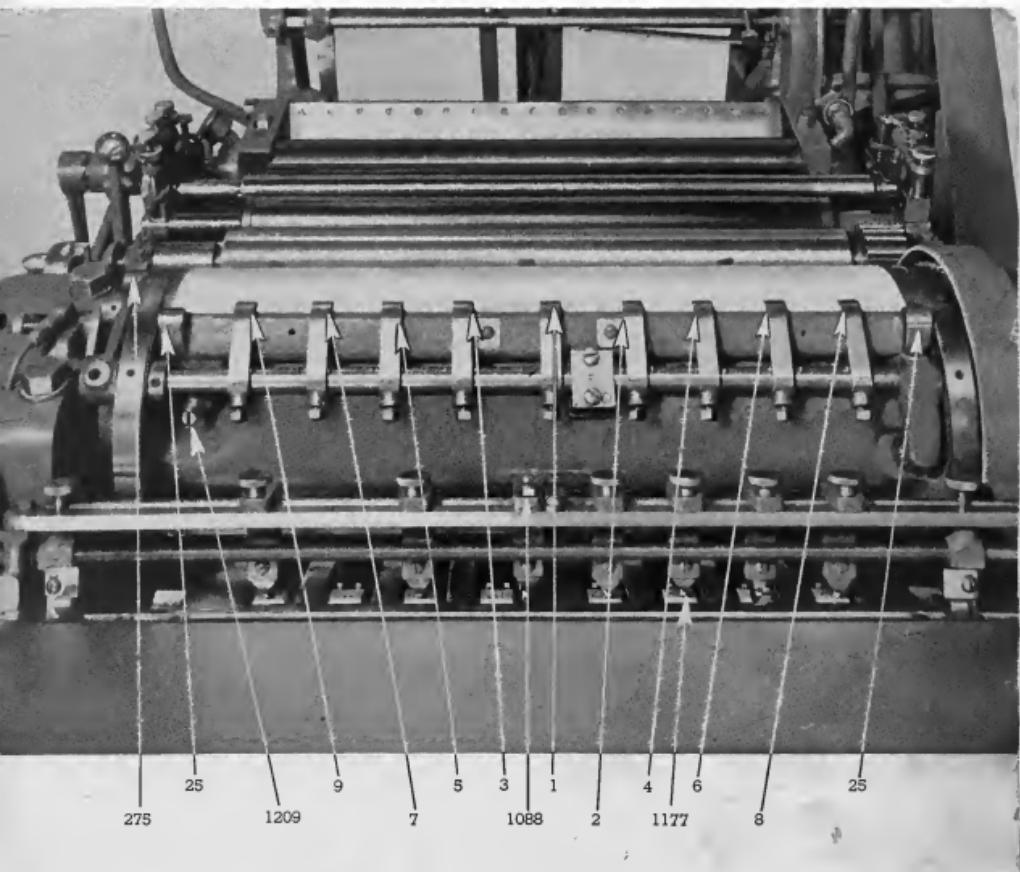
When loading elevator, pile stock with curl down whenever possible. Adjust height of pile of stock in elevator by turning thumbscrew No. 1004, Fig. 334 (page 7). The height of the pile should be regulated so that there is always a small space between the top of the pile and the sucker tips. This permits sheets to be fluffed and aired. Note: If this space is too great, the suckers will not pick up the sheets and the press will trip off.

**SUCKER TIPS**—When running on light weight stock the small-holed metal sucker tips should be used. For medium weight stock use the large-holed metal sucker tips. For heavier weights and envelopes use the rubber sucker tips. Be very careful not to place sucker tip holders on spaces painted red on the feeder bar.

## FEEDING AND REGISTERING OF SHEETS

**FEEDING**—To feed paper, turn cam lever No. 1307, Fig. 334 (page 7), to downward position after press is in motion. The feeder bar will

then place sheet in position on panel. This sheet is then fed through, taking an impression. Check the position, making adjustments at this



**FIGURE 335**—Top View of Press Showing Cylinder Grippers and Lower Edge of Feed Table

275—Gripper Stop Lug

25—Tympan Clamp and Register

1209—Screw for Releasing Tympan  
Clamp

1, 2, 3, 4, 5, 6, 7, 8, 9—Gripper  
Fingers

1088—Screw for Adjusting Two Sheet  
Detector

1177—Drop Finger Guards

time with the side guide No. 777, Fig. 336 (page 11); then check drop guide finger guards No. 1177 for clearance, Fig. 335 (page 9).

**TWO-SHEET DETECTOR** — Adjust the two-sheet detector No. 1088, Fig. 335 (page 9), by folding a sheet of the stock to be run so that one edge will extend about 1" past the other. Then slide this under the ball and adjust up and down until the one sheet will slide through freely, but two sheets will bind.

There are four hose nipples and two dummy nipples No. 504, Fig. 338 (page 15), on the sliding register carriage. A majority of jobs can be run with the two center suction guide fingers, but for large sheets all four suction guide fingers should be used. Suction can be applied to the drop guides with air ports by removing hose from dummy nipples and attaching to guide finger hose nipples. When running small sheets that do not cover port holes on outside guide fingers, the hose must be replaced on dummy nipple or the impression mechanism will refuse to function.

**HAIRLINE REGISTER** — Two sliding bars No. 1016, Fig. 338 (page 15), on the sliding register carriage beneath the feed table contact with register stops on cylinder No. 25, Fig. 335 (page 9). Contact adjusting nut No. 1046, Fig. 333 (page 5), should be so adjusted that a distinct sound is heard when the register carriage and cylinder strike together. Drop guide finger guards No. 1177, Fig. 335 (page 9), must be set down close to register vacuum fingers to seal them quickly. Care must be taken so that these are not set tight enough to bind the sheet or there will be a loss of register.

**CHANGING SIDE REGISTER** — To change the side register from left to right, loosen screw on shaft and set cam lever No. 154, Fig. 334 (page 7), to the opposite screw spot on the pivot shaft. Then tighten screw so that it engages the spot hole on the shaft.

**ADJUSTING FRONT REGISTER** — Front register is controlled by moving the register panel shown beneath the feed table

No. 943, Fig. 338 (page 15), forward or backward by turning the thumbscrews No. 1004, Fig. 338 (page 15), which are reached through the handhole in the feeder arm guard.

**EMERGENCY STOP** — To stop the press in an emergency, push the handle No. 200A, Fig. 333 (page 5), to the right. This will trip the clutch handle No. 66, Fig. 333 (page 5), and the brake will act automatically.

**SPEED** — To increase speed of press, turn speed adjusting screw No. 246, Fig. 333 (page 5), to the right. To decrease speed, turn to the left.

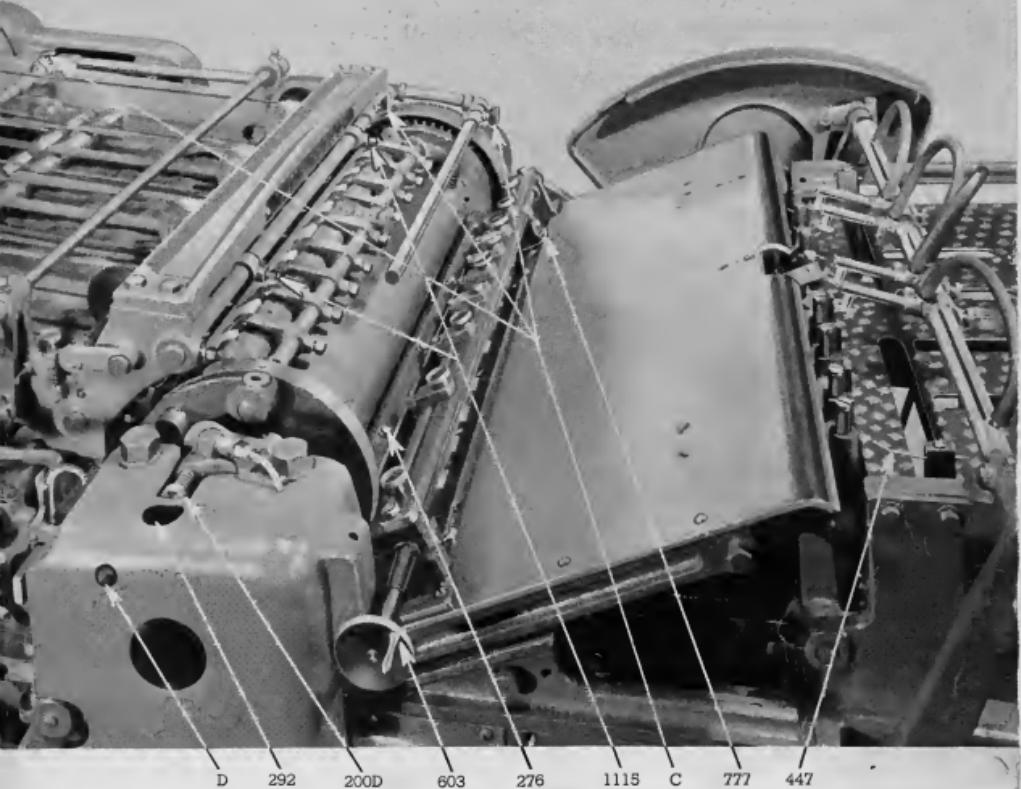
#### **ADJUSTING BED AND CYLINDER TRAVEL**

**TRAVEL** — The bed and cylinder travel must be changed for the delivery of varying sheet lengths by turning handwheel No. 36, Fig. 333 (page 5). To lengthen the travel distance, turn the handwheel in the direction the arrow points. To shorten, reverse the direction. Adjustment should be made by running a sheet through the press and having the tail of the sheet at the greatest distance from the delivery table. First pull out the locking pin No. 1413, Fig. 333 (page 5); then turn handwheel No. 36, Fig. 333 (page 5), until tail end of the sheet clears the stripper fingers by approximately  $\frac{1}{4}$ ". Then replace locking pin, making sure that it engages in one of the holes.

**BALL-UP THROW-OFF AT DELIVERY** — If sheets ball up at stripper fingers, the press is tripped at No. 1134, Fig. 337 (page 13). The press will continue to trip unless the bar is reset by lifting up on the spring hook. It is always a good plan in case of a ball-up to raise the delivery and roller carriages and check for torn pieces of stock on plate and rollers.

#### **ADJUSTING AND SETTING FOUNTAIN**

**FOUNTAIN** — Fountain screws are numbered 0 - 6 from center out. These coincide with numbers on delivery frame. The fountain can be set at the beginning of a run without a lot of waste sheets. The amount of ink needed for the make-ready should be about right for the running of



**FIGURE 336** — Top View of Press Feeder End

D — Impression Clamp Screw  
292 — Impression Rod  
200D — Gripper Cam  
603 — Hand Wheel for Adjusting  
Side Guide

276 — Tympa Bale  
777 — Side Guide  
1115 — Star Wheels  
C — Air Blast Valves  
447 — Feeder Separation Wires

the job so that the sheet that is submitted for final o.k. can be used for running sample.

First adjust the keys to obtain the flow of ink that seems correct for the form. This should be even across the entire width of the fountain, regardless of the size of the form. The reason for this is that it permits the blade to lie evenly without danger of bind or buckle. Then working from the center screw, adjust the flow lighter or heavier at such parts of the form where more or less ink is needed. Then, still working from center, shut those keys in margins and beyond the ends of the forms, being careful that these last adjustments do not affect the adjustments in the other areas. The blade should not be set so as to scrape the ink clean from the fountain roller in the margins. It is here that many pressmen have trouble. If, in setting the fountain, there is excessive ink on the duotor roller that is likely to flood the form, wash off the duotor roller. The fountain screw adjustment should be made so that the adjustment for regulating the number of notches in turning the fountain roller No. 1192,

Fig. 337 (page 13), can be set so the run can be started with about two notches less than the full adjustment. The reason for this is that as the ink becomes agitated from the turning of the fountain roller it thins out and then by adding a notch or two the same amount of ink can be held without changing the fountain screws.

To save waste in sheets when setting fountain, run a few sheets. Then stop the press to see if any part is running light or heavy, in which case the heavy places should be washed off. In the light places, open the keys and add a little ink on the duotor roller with knife. Pull two sheets to see if the ink washed off or that put on is sufficient. If so, run eight or ten sheets. Stop press again and check the amount of ink. If still not right, put on more or wash off ink where required. Do this until the fountain is set correctly. By setting the fountain in this way — after two or three stops — the setting will be so nearly correct that further stops will be unnecessary. In a great number of instances many of these sheets can be saved for the job and not wasted.

## DELIVERING SHEETS

After getting a sheet on cylinder for clearance of stripper fingers, the air blast is adjusted (C), Fig. 336 (page 11), by turning the petcock which regulates the amount of air to hold sheet down or let it raise so that it can be delivered on to the tapes. There are also two star wheels No. 1115, Fig. 336 (page 11), which can be adjusted to help in the delivery of sheets. The sheet then is run on to the front delivery tapes and the star wheels and tapes are adjusted over the sheet so as to run in the blank margins. The sheet is then run on to the rear moving tapes and the air blast valve (C), Fig. 336 (page 11),

is regulated to help control the sheet.

The sheet will then be deposited on the delivery table. The jogger guides and backstop can now be set. The right-hand jogger guide, as the operator stands at the rear of the press, should be set out from  $\frac{1}{2}''$  to  $\frac{5}{8}''$  away from the edge of the sheet as this moves in and out to jog the sheets. If the tail of the sheet drops down and scrapes on the printing, the air blast valve at the left of delivery table should be turned to allow enough air to blow under the sheet so that as it comes out it will fall on the sheet below without scraping.

## OPERATING AIDS

### IF SHEETS FAIL TO FEED —

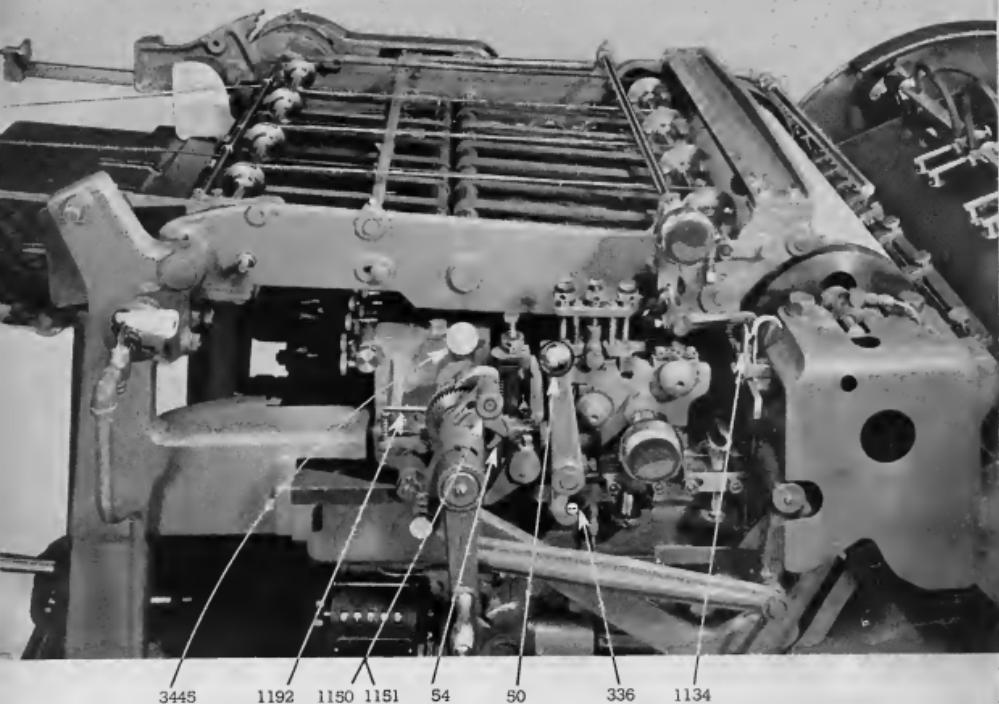
Stock pile too high.

Stock pile too low.

Incorrect blast adjustment.

Stripper wires not set correctly.

Open line because of plug or sucker tip omitted.



**FIGURE 337 — Top View of Press Delivery End**

1192 — Regulator for Feed of Ink  
Fountain Notches  
3445 — Fountain Grease Cup  
1150 and 1151 — Throwoff Cam for  
Fountain Dog

54 — Roller Clamp Bracket for  
Adjusting Ductor Roller  
50 — Roller Carriage Locking Handle  
336 — Eccentric Studs for Adjusting  
Roller Carriage  
1134 — Sheet Ball-up Trip

### **LOSS OF REGISTER —**

- Finger guards down too tight.
- Sheet is pulled out of grippers.
- Finger guards too high. Sheets go over to gripper fingers.
- Two-sheet detector set down too tight.
- Small sheets — if sheet does not completely cover suction ports on sliding panel they should be closed off.
- Too much gripper bite.
- Set over cylinder edge and hitting small brass kick-out plates on cylinder.
- Not enough gripper bite.
- Slide bars on sliding panel hitting too hard.
- Back off contact adjusting nut.
- Slide bars on sliding panel not hitting hard enough. Turn the nut in.

### **LOSS OF SIDE GUIDE REGISTER —**

- Triangle cam too tight in slide.
- Feed bar cam hitting side register finger.
- Side register adjusting wheel hitting guard.
- Slow-down spring finger too tight.
- Side guide guard not set properly.
- Stock pile set more than  $\frac{1}{4}$ " inside of side guide or too close and striking guide.
- Too much play in type bed. Use care in checking after making this adjustment.
- Bed should not bind in any position of its travel.

**SLURRING** — The "slur eliminator" furnished with the press should be locked at the rear end of the form, with operating levers pointing away from type, to eliminate any difficulty occasioned by the lower end of the sheets dragging off the form and blurring the last line of type or rule.

**ADJUSTING VIBRATOR NUTS** — A revolving nut at the vibrator end is a safety measure. If the nut turns continually while the press is running, a little more spring pressure is required. To obtain this, remove the wires through the heads of the screws and give each a one-half turn before restarting press. If the nut holds, replace wire lock. Do not tighten the nut cap any more than necessary to keep nut from turning. Otherwise undue strain will be put upon the press.

### **ADJUSTING ROLLER CARRIAGE**

**LOCK** — If the roller carriage does not lock tightly enough, adjust the eccentric studs No. 336, Fig. 337 (page 13). This is done by lifting the roller carriage, then loosening the setscrew and turning the eccentric slightly. *Tighten the setscrew before trying adjustment.* If the setscrew is not tightened each time before the locking is tried, the action of the locking levers may turn studs out of adjustment.

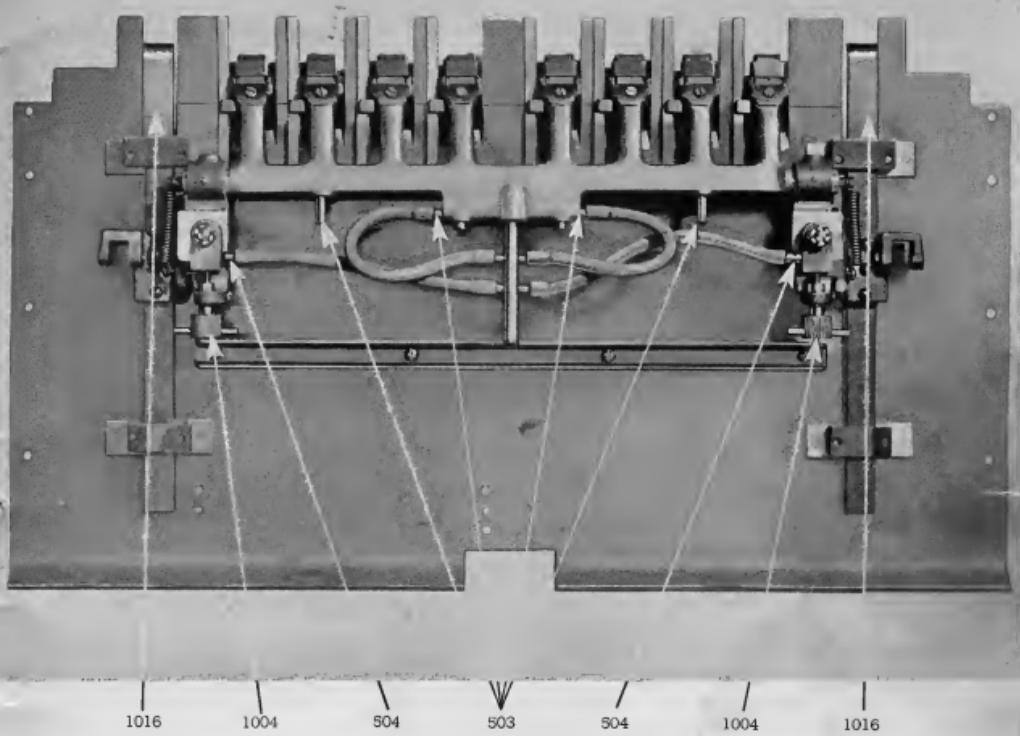
**IMPRESSION** — To turn press on impression, turn it forward in direction indicated by arrows on flywheel and press down on handle No. 716, Fig. 333 (page 5).

Cylinder bearers should always be in contact with bed bearers during impression. In a new press, bearings will settle after a few months' running. If this affects the impression, the cylinder should be reset. Contact of cylinder bearing with bed bearings can be inspected by looking through from delivery end of press. If light shows between bearings when cylinder is on the form, the cylinder should be lowered.

To lower cylinder, run press on impression. Loosen clamp screw (D), Fig. 336 (page 11), and use socket wrench to turn impression rod No. 292, Fig. 336 (page 11), anticlockwise and evenly on both sides until it is fairly tight. Turn press over by hand after making adjustment. If the press turns too hard on impression, turn the bolt slightly in opposite direction until action becomes more free. *Draw clamp screw up tightly after impression is corrected.*

**ADJUSTING TYPE BED GIB** — To take up side wear of type bed, loosen lock nut and turn adjusting screw to the right. If the gib is set too tightly, it will slow up the press. After adjustment is made, tighten up lock nut.

**LOSS OF VACUUM** — If vacuum becomes too weak, examine rubber tubes for plugged-up ends and the pump hose for worn spots. Continued low vacuum may be caused by gummed-up pump blades. If such is the case, open pump, remove the rotor and clean blades. Oil blades before replacing in pump. Also check hose on sliding panel to see if it has collapsed at the bend or split along seam.



**FIGURE 338—Under Side of Feed Table**

1016 — Sliding Bars Contacting Register Stops  
1004 — Thumbscrews for Adjusting Front Register  
503 — Feeding Nipples  
504 — Dummy Nipples

# PRINTING HELPS

**MAKE-READY HINTS**—After the guides are set, position o.k., should be obtained. Then the first trial impression may be pulled on a sheet of S. and S. C. and the next on a sheet of the same placed over a sheet of stock to be used on the job. Just the corners need print clear. The sheet is then stabbed while in the grippers and is turned over and held at an angle to the light so that the impression on the reverse of the sheet may be studied before marking out for overlay. It is well to glance across the back of the sheet in both directions to note the peculiarities of the impression. For type, rules, zinc line cuts (everything except half-tones and rubber plates), the impression is marked out on the back of the sheet. Even the edges of half-tones show on the back of the sheet and may be studied as an impression guide.

**MARKING OUT**—All corners printing clear are missed by the first mark, which takes in the space inside the corners. Succeeding smaller marks take in the spots further toward the center of the form. These concentric marks indicate the size and shape of the tissue overlay patches, which are carefully attached, smooth and flat, to the marked-out sheet with paste that is free from lumps. The overlay sheet is pasted in register on the sheet of paper in the packing preferred. A blank sheet is removed from packing for each overlay sheet inserted. Another trial impression is pulled on stock to be used. Perhaps no further patching is needed or at most a few patches in spots will complete the needed impression. If not, another overlay is made and registered over the first.

Overlays for half-tones and rubber plates are marked out on the face of the sheet with carbon paper beneath it. This marked-out overlay should

be registered on the bottom sheet of packing and cut overlays should be registered on it.

Mechanical cut overlays are economical because they can be prepared in less time than a hand cut overlay. Directions come from the manufacturers. Point to remember about chalk overlay: Heat the overlay board to drive out moisture before pulling the impression to be etched. The card will swell in the etching solution, but after it is removed it will shrink as it dries but no smaller than when heated.

The cut-out is a time-saver in making ready large solids; it improves the print and yields with the overlay a thorough make-ready that makes possible good coverage without excess ink, thus avoiding offset. Also the edges of the plate are not punching on the reverse of the sheet to scratch ink from the face of the next sheet. The cut-out is used to advantage on large letters, heavy rules, etc., as well as solid plates, to remove squeeze from the edges and place it in the center. An impression is pulled on paper or thin card and is then cut out of the sheet, cutting a point inside of the edges with a bevel outward. The cut-out is pasted in register on the sheet next below the tympan.

**REGISTERING UNDERLAY OR INTERLAY ON BACK OF PLATE**—Sometimes an underlay between a plate and patent base, or an interlay between plate and wood base, is hard to register because of the shape of the printing surface of the plate. Slits in the underlay permit matching with points in the face of the plate. The underlay is then creased on its edges over the four corners of the plate. With these four angles as guides the underlay may be squared and pasted in the center of the back of the plate and the close approach to register needed is obtained.

## **PRINTING FROM RUBBER PLATES**

The wide use of rubber plates has made many printing problems easier. All hard, rough, uneven papers are better printed from rubber and the appearance of the surface of the paper remains unaltered, which is impossible when it is crushed by a metal form. Surfaces other than paper, hard, or impossible-to-print forms, such as celluloid, cellulose tissues, wood, metal sheets, fiber and glass, are easily printed from rubber. Make-ready is easier and ink consumption 25 per cent less with rubber forms. Coverage is better, and as no embossment shows on the reverse of the sheet, there is less offset. Rubber casts of the smallest type and half-tones as fine as 110 line screen are practical. A very light impression is used. An overlay has a spreading effect on a rubber plate which is absent on a metal one. Gasoline and kerosene are not used, but a mixture of alcohol and benzol is a good wash for rubber. Overlays are marked out on the face of the sheet with a carbon sheet beneath it, same as for half-tones.

## **DUOTYPES AND DUOGRAPHHS**

A duotype is a print from two half-tone plates made from the same negative and etched differently. One half-tone, etched flat, is used as a tint block and the other re-etched half-tone is printed in a full-strength ink. The harmony may be that of analogy when the tint is made with the full color as base or it may be that obtained by contrast of color between the two prints.

A duograph is a print from two half-tone plates made from the same copy but with the screen at different angles. Either a full color ink and a tint of it may be used or inks with contrast of color. The great possibilities of these two-color prints may frequently be noted on magazine covers. Persian orange and green-black is a favorite combination.

**CARE OF PRINTING INK**—Inks are generally delivered with a strip of gummed tape around the bottom of the lid of the can to keep out the air. After the tape is removed, if the lid cannot be raised easily, insert a thin blade between can and lid. Holding the blade against the can, work the blade around until the lid can be removed without breaking it or spoiling its fit

over the can. Rub vaseline on the inside of that part of lid that surrounds the can so that it may be removed easily in the future. After a withdrawal of ink from the can, the remaining ink should be leveled and covered with a piece of paper smeared with vaseline. The lid is replaced and gummed paper should be stripped around the can where the bottom edge of the lid surrounds it, just as when received from the ink maker. You will be pleased to find this procedure keeps the ink from going to waste in the can for a considerable period.

Ink that has picked up a lot of lint and dirt from the paper and the air during a long run should not be put into a can with clean ink but kept in a separate can for use on a cheap job. Dirt in ink may be kept at a minimum if the entire circumference of the steel fountain roller is carefully washed to remove all dry and gummy ink while any skin on top of the ink in the fountain should be removed each morning before starting the run. The fountain should be kept covered night and day. Dirt gets on paper in transit from the mill and by watching for it when opening the case or other container, the dirt may be removed with the wrapping and kept out of the stock. A dull knife makes more dirt and dust on the cutting machine than a sharp one. By careful jogging and keeping the table of the cutting machine clean, much dirt may be kept from getting into the stock. The pressroom floor should not be swept while presses are running.

**TINTS**—There are three sorts of tints: opaque, to hide the color of the paper; translucent, for use where the color of the paper need not be hidden; and transparent. The opaque tint is mixed with titanium cover white as base. This is the best cover white, but two or three impressions without moving the gauges may be needed to get a good white on black or dark colors. Aluminum cover ink has the best hiding power among printing inks. The first impression should be well set but not bone dry before the second "hump." Many colored cover inks are merely tinted cover white since there are few opaque colors. There is no opaque blue; and English vermilion, the only opaque red, is costly.

Mixing white, mixing magnesia, gloss white or

a combination of two or all of these may be used as base for tints not required to be opaque and not to be used on coated paper.

For transparent tints on coated paper, alumina hydrate ground in linseed oil varnish is the best and safest tint base. When mixing tints, caution is in order at the start lest too much colored ink be added to a large batch of tint base. A small trial mix is safer.

The simple tints made by adding a color to white are easy and a great variety is made possible by adding blue, red, yellow, or green to the original simple tint. Good tints for use on coated paper are made by adding process red, process blue, and transparent process yellow to alumina tint base. This tint base (with process or half-tone black) yields gray, which may be altered with the colored process inks to provide a number of gray tints.

In mixing and matching tints, shades, and colors, the task will be easier if the effect produced by the principal colors is realized and always kept in mind. Black cannot deepen a color — but tends to make it muddy or dirty looking. White cannot add light or brightness to a color — it can only make it paler. Yellow adds brightness, and red adds warmth, to a color. Blue makes a color cold. In green, which is a mixture of blue and yellow, are seen the coldness of blue and the brightness of yellow. A purple, mixed from red and blue, will be warm or cold according to the preponderance of red or blue. When a mixed color of unknown origin is viewed for the first time, careful scrutiny may determine whether there is white, which would produce a pale cast; yellow, which would make a bright mixture; red, making it warm; or blue with its coldness. In order to study the effect of added colors in a mixture, make a simple brown by adding black to deep orange chrome yellow, which should then be altered by adding to different portions, yellow, red, blue and green. Instead of using black to deepen them, yellow is deepened by adding purple; red by adding green; and blue by adding the burnt sienna shade of brown.

**MULTICOLOR PRINTING** — In two-color printing on coated paper, it is better to print the black or dark key plate first and overprint it

with a transparent colored ink. By running the black full strength it is easy to get the proper effect with the colored ink. If the color is run first and varies toward light or dark, this condition can not be corrected with the black. By adding paste drier to the overprinted color, prompt drying is obtained; but if the color is run first with a retarder in it so that the black will take well, drying will be delayed. If the color is run first with drier in it, drying may crystallize the color so that wax may have to be added to the black to make it take. One will have little trouble with overprinted ink on black half-tone ink if the colored ink is mixed from process colored inks and alumina hydrate tint base. Register trouble is minimized also by running the key form first.

Whenever possible, it is easier to run the black or key form first in four-color process work. After position o.k. on this form, one need have little register worry. The black will not crystallize and with paste drier in the last color all the colors will set well.

Some ink makers state they now make process inks practically trouble-proof, i.e., they need no conditioning by the pressman against crystallization, slow drying, poor trapping, etc. If such inks are not available it is well to add a half ounce of lanolin to the pound of ink. No lanolin is added to the last color, but instead a half ounce of paste drier to the pound of ink, except that when black ink is used the same quantity of cobalt drier is added. If a high gloss is wanted, a half ounce of gloss drying-varnish is added to the last color.

It is necessary to keep close watch on the ink to see that it leaves the form clean after each impression and neither piles on nor fills the plate. This must be watched when overprint varnish is to be printed over an ink. The ink must have a homogeneous surface if the overprint varnish is to be smooth. The ink should be quite dry before overprinting the varnish. The sheet heater and spray are great helps.

**MOTTLE IN INK** — Mottle in the ink is a frequent cause of trouble. Too much reducer is often used because of insufficient make-ready. Mottle is most common on forms with solid plates and very often the attempt is made to print the solids with surplus ink and scant make-ready.

Too much ink, however, will cause mottle. After a solid plate is made level, is type high and thoroughly made ready with overlays, the impression should be strengthened in the center and removed from the edges with a cut-out so that it is possible to print with less ink. The better the ink, the thinner the film that can be carried for coverage.

#### **CAKING OF INK ON PLATES—**

When ink cakes on plates it forms a surface which when printed on paper is unfavorable thereafter to the reception of other inks or to overprint varnish. This fault is common with inks containing pigments of high specific gravity and low oil absorption. The form must be watched in plate printing as carefully as the print. If the ink starts to cake and pile on the plate, a little alumina hydrate tint base, or mixing magnesia, should be mixed with the ink and some No. 3 varnish if a tendency to mottle appears.

#### **PRINTING WITH METALLIC INKS—**

Aluminum ink has been improved so that it may be bought mixed in the can ready to use. It may be bought with body suited to paper on which it is to be used, as aluminum cover ink, or in softer grades for use on coated paper. Gold ink is best mixed just before it is to be used. On cover and other absorbent papers it is necessary to make two impressions, the first in a base size. When it is well set, but not bone dry, the metallic ink is overprinted. Sometimes one impression will pass on coated paper, but generally it is necessary to make two impressions in metallic ink, allowing the first to become well set before superposing the second. The first impression is moderately inked.

It is well to make ready with a light ink, such as orange, since the metallic ink may dry on the press. Excessive squeeze should be avoided and the make-ready be thorough and complete. The rollers should be firm and resilient and neither hard nor soft. Set them with the orange ink and vibrators off so that the outlines of the form may be seen clearly in the film of ink on the rollers as they pass up on to the ink plate after having inked the form. If the outlines cannot be seen or are very faint, the roller contact is too light and the rollers cannot function. The outlines will be

squashed if the roller pressure is excessive and the rollers should be raised. This is the guide to form roller setting for all inks. When using metallic inks the vibrators should be in firm contact with the form rollers. If a metallic ink lacks luster, there is too much varnish for the powder, while if it piles on the edges of the form very much, the powder is in excess.

#### **KEROSENE AS REDUCER—**

Besides being the best wash for use on composition rollers, kerosene is an excellent reducer when it is necessary to decrease the tack of an ink that is picking and no soft reducing ink is on hand. Kerosene has no superior at any price for this purpose. The best grade is used. Petrolatum is useful for the same purpose when the body of the ink must be retained. Of course these reducers, like all others, should be used sparingly because any such addition to the ink tends to weaken the color.

#### **INK TROUBLE—**

Probably more work is spoiled on account of ink trouble than any other cause. Due to the demand for high speed, inks are expected to set and dry rapidly. Many printers imagine this can be accelerated by adding a generous quantity of drier. This is an error which results in making the ink sticky so that it piles on and fills the form, causing picking and offset. The ink maker so treats and compounds pigments, varnishes, driers, wax, etc., that the ink will work well and dry in from three to twelve hours. The printer cannot hasten drying except with heat, which assists absorption by the paper and penetration of the ink. Moisture is driven out of the paper, which absorbs the ink instead, and the ink is made thinner and more fluid so that it gets into the paper faster. Heat is more effective with absorbent papers. If ink can penetrate and set well, no drier need be added if the room is warm while superposed inks will set and take well in a warm plant.

If the ink does not penetrate and is not absorbed but remains on the surface, trouble may be expected — either chalking, sticking, offset, or failure to take on preceding color. Proper setting leaves the ink open and provides the paper with a soft, velvety finish on which following colors take and lay well.

Quick setting is best obtained by using an ink

strong in pigment and running the thinnest film that will cover. A compound that helps an ink to set quickly and minimizes offset is composed of paraffin wax and lanolin, equal parts, melted together. A half ounce of this mixture and a half ounce of corn starch in a pound of ink help it to set and keep down offset — but the best safeguards are ample heat, absorptive paper, ink strong in color, thorough make-ready, and a very thin film of ink.

Sheets likely to offset should not be jogged and should be moved carefully. Solids should be made ready with a cut-out in addition to the overlay to avoid embossment of the edges of the plate on the reverse of the sheet which will cause offset by scratching the wet ink on the face of the sheet following.

The spray is invaluable in superposing one ink on another where the sheet heater is not so effective.

The printer should not consider drier an offset preventative while a quick setting and drying compound for it is neither. A drier is a safeguard against too long delayed drying — insurance that the ink will dry in a reasonable time.

Offset and sticking are often caused by ink too heavy for the paper, too much ink and static electricity. The static holds the sheets together so that the air cushion is absent.

Too much squeeze can cause picking on coated paper by breaking the coating.

When running color work on unknown paper the ink maker should be given a sample so that the inks may be suited to the surface of the paper to avoid picking, filling, offset, poor trapping, excessive gloss, and too hard drying — commonly called crystallization.

If colors are superposed on others not well set the print will be dead and flat without snap.

Sometimes an ink is encountered that dries too fast on the press and causes filling and caking. A wash-up may be necessary, because the ink has dried on plate and rollers. A half ounce of lanolin to the pound of ink checks too rapid drying.

**TINTS UNDER HALF-TONE PRINTS** — The rubber plate prints solids so well that the custom of putting a tint on paper and then overprinting a half-tone is being re-

vived. Such tints add life and beauty to the half-tone print. With rubber plates, uncoated paper may be used. The plates are not costly and may be made in standard sizes, stored after the first job and used later. Tints of cream and buff are pleasing under black and other tints may be used to advantage. Brown and violet half-tone prints are improved by a tint ground.

**DRIERS** — If driers were not added to inks, drying would be too slow for further operations after the first color is printed. In the case of single color prints delivery to the customer would be too long delayed unless prompt drying in a few hours or overnight is obtained. (Special inks are made to dry with heat almost as soon as they hit the paper. A number of such inks are on the market and further research is expected to yield a complete line of these especially quick drying inks, which are made from different vehicles than regular inks.)

Most ink is formulated to dry in a few hours, since most jobs do not require quicker drying. The ink and drier are made for use at an average temperature and average relative humidity. Drying is retarded in a damp or cold room. The drying is a chemical reaction and theoretically the speed of the reaction is about double for every twenty degrees rise in temperature. Every printer knows that a temperature of from seventy-five to eighty degrees favors drying.

Japan driers tend to make ink sticky. Cobalt driers are used in black, dark colors and white, and the lead-manganese driers are favored for the light colors. Some pigments, such as chrome yellow, chrome green, bronze and Milori blue, and umber, are natural driers and need little added siccative.

**OVERPRINT VARNISHING** — Overprint varnishing has come into general use. Surface coated stocks are suitable. Either metal or rubber plates may be used. The choice of ink is important. It must cover and leave the plate smoothly without caking or piling and must transfer cleanly to the paper, leaving the plate clean after each impression and lying in a homogeneous film on the paper. Otherwise the varnish film cannot be satisfactory. Enough ink must be carried to cover and two impressions of some inks

may be necessary on certain papers. The ink must not be simply well set, as when overprinting ink; it must be dry before overprinting varnish.

After inking up in a light ink, the make-ready should be thorough and complete. To avoid sticking, an excess of varnish should not be carried. After make-ready, the fountain should be set until the varnish almost, but does not quite, cover; then opened up until it covers without excess varnish. By holding the sheet in a suitable light, the coverage of the varnish may be seen. A patch of tissue in spots may correct the coverage without using more varnish.

The best overprint varnish gives less trouble but all such varnishes must be watched very carefully. The sheets should be delivered into shallow racks and "woke up" every few hours. In two or three hours the lifts first varnished should be examined and if the sheets make a swishing noise when separated, the varnish is sufficiently set to

require winding. In another two or three hours the sheets should be winded again. If the right quantity of varnish is used, the sheets should be left to dry about twelve hours after winding shows no danger of sticking.

If the sheets in the first lifts show no tendency to stick, the varnish may be going into the paper because the ink is not dry or does not completely cover the surface under it. When this is the trouble, the varnish will appear spotty instead of uniform.

If the spotty appearance is not due to poor coverage but to the varnish sticking to the next sheet so that it is pulled off, too much varnish is being fed. The feed should be decreased and the proper coverage obtained by more thorough make-ready.

Varnish is affected by changes in temperature and relative humidity.

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## ADDITIONAL NOTES

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